NETGEAR RangeMax NEXT Wireless Notebook Adapter WN511T User Manual

NETGEAR®

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202-10186-03
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Technical Support

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Maximum Wireless Signal Rate Derived from IEEE Standard 802.11 Specifications

Actual data throughput will vary. Network conditions and environmental factors, including volume of network traffic, building materials and construction, and network overhead, lower actual data throughput rate.

Safety and Regulatory Notices

FCC Statement

The WN511T has been tested and complies with the specifications for a Class B digital device, pursuant to Part 15 of the FCC Rules.

Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and

(2) This device must accept any interference received, including interference that may cause undesired operation.

These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used according to the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which is found by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment or devices
- Connect the equipment to an outlet other than the receiver’s
- Consult a dealer or an experienced radio/TV technician for assistance

FCC Caution: Any change or modification to the product not expressly approved by Netgear could void the user's authority to operate the device.

FCC RF Radiation Exposure and SAR Statements

SAR Statement

The Netgear WN511B has been tested for body-worn Specific Absorption Rate (SAR) compliance. The FCC has established detailed SAR requirements and has established that these requirements have been met while installed in host notebook computer.

RF Exposure Information

The radio module has been evaluated under FCC Bulletin OET 65C (01-01) and found to be compliant to the requirements as set forth in CFR 47 Sections, 2.1093, and 15.247 (b) (4) addressing RF Exposure from radio frequency devices. This model meets the applicable government requirements for exposure to radio frequency waves. The highest SAR level measured for this device was 0.442w/kg.

Canadian Department of Communications Industry Canada (IC) Notice

This Class B digital apparatus complies with Canadian ICES-003 and RSS-210. Cet appareil numérique de la classe B est conforme à la norme NMB-003 et CNR-210 du Canada.

"To prevent radio interference to the licensed service, this device is intended to be operated indoors and away from windows to provide maximum shielding. Equipment (or its transmit antenna) that is installed outdoors is subject to licensing."

"Pour empêcher que cet appareil cause du brouillage au service faisant l'objet d'une licence, il doit être utilisé à l'intérieur et devrait être placé loin des fenêtres afin de fournir un écran de blindage maximal. Si le matériel (ou son antenne d'émission) est installé à l'extérieur, il doit faire l'objet d'une licence."

Europe - EU Declaration of Conformity with Regard to R&TTE Directive 1999/5/EC

A printed copy of the EU Declaration of Conformity certificate for this product is provided in the WN511T product package.

Èesky [Czech]	NETGEAR, Inc. tímto prohlašuje, že tento NETGEAR RangeMax™ NEXT Wireless Notebook Adapter WN511T je ve shodì se základními požadavky a dalšími pøíslušnými ustanoveními smìrnice 1999/5/ES.
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Español [Spanish]	Por medio de la presente NETGEAR, Inc. declara que el NETGEAR RangeMax™ NEXT Wireless Notebook Adapter WN511T cumple con los requisitos esenciales y cualesquiera otras disposiciones aplicables o exigibles de la Directiva 1999/5/CE.
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Product and Publication Details

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Contents

About This Manual

Conventions, Formats, and Scope ix
How to Use This Manual x
How to Print this Manual x

Chapter 1
Basic Setup

What You Need Before You Begin 1-1
Verify System Requirements 1-1
Observe Wireless Location and Range Guidelines 1-1
What Is in the Box 1-2
Default Wireless Settings 1-2
Installation 1-3
Connecting to Wireless Networks and the Internet 1-7
Icon Colors 1-7
Smart Wizard Status Bar 1-8
Removing the Software 1-9
Upgrading the Wireless Adapter Software 1-9

Chapter 1
Network Connections and Wireless Security

Disabling the Windows Zero Configuration Utility 2-1
Understanding the Smart Wizard 2-2
Viewing Wireless Networks in Your Area 2-2
Finding a Network 2-4
Profiles 2-5
Adding Profiles 2-5
Setting up a Profile to Connect to an Access Point or Router 2-5
Setting up a Computer-to-Computer (Ad Hoc) Profile 2-7
Starting a Computer-to-Computer (Ad Hoc) Network Connection 2-9
Wireless Security 2-10

Using Wireless Security Features 2-10
Wireless Network Name (SSID) and Security Settings 2-11
Setting up WEP Encryption Security 2-12
Setting up WPA2-PSK Security 2-13
Setting up WPA-PSK Security 2-14
Advanced Settings 2-16
Statistics Page 2-16
About Page 2-17

Chapter 1
Wireless Network Performance

Optimizing Wireless Performance 3-1
Optimizing Your Network Bandwidth 3-2
Overview of Home and Small Office Networking Technologies 3-3
Assessing Your Speed Requirements 3-4

Chapter 1
Troubleshooting

Troubleshooting Tips 4-1
Ad Hoc Mode is Not Working Correctly 4-2

Appendix A
Default Configuration Settings and Technical Specifications

Default Configuration Settings A-1
Technical Specifications A-2

Appendix B
Related Documents

About This Manual

The *NETGEAR® RangeMax™ Wireless Notebook Adapter Model WN511T User Manual* describes how to install, configure, and troubleshoot the NETGEAR RangeMax NEXT Wireless Notebook Adapter WN511T. The information in this manual is intended for readers with intermediate computer and Internet skills.

Conventions, Formats, and Scope

The conventions, formats, and scope of this manual are described in the following paragraphs:

- **Typographical Conventions.** This manual uses the following typographical conventions:

Italics	Emphasis, books, CDs, URL names
Bold	User input

- **Formats.** This manual uses the following formats to highlight special messages:

	Note: This format is used to highlight information of importance or special interest.

	Tip: This format is used to highlight a procedure that will save time or resources.

- **Scope.** This manual is written for the WNT511T Wireless Notebook Adapter according to these specifications:

Product Version	NETGEAR RangeMax NEXT Wireless Notebook Adapter WN511T
Manual Publication Date	February 2007

For more information about network, Internet, firewall, and VPN technologies, see the links to the NETGEAR website in Appendix B, "Related Documents".

	Note: Product updates are available on the NETGEAR, Inc. website at *http://kbserver.netgear.com/products/WN511T.asp*.

How to Use This Manual

The HTML version of this manual includes the following:

- Buttons, > and <, for browsing forwards or backwards through the manual one page at a time
- A button that displays the table of contents and an button. Double-click on a link in the table of contents or index to navigate directly to where the topic is described in the manual.
- A button to access the full NETGEAR, Inc. online knowledge base for the product model.
- Links to PDF versions of the full manual and individual chapters.

How to Print this Manual

To print this manual you can choose one of the following several options, according to your needs.

- **Printing a Page in the HTML View**.

  Each page in the HTML version of the manual is dedicated to a major topic. Use the *Print* button on the browser toolbar to print the page contents.

- **Printing a Chapter**.

  Use the *PDF of This Chapter* link at the top left of any page.

  – Click the *PDF of This Chapter* link at the top left of any page in the chapter you want to print. The PDF version of the chapter you were viewing opens in a browser window.

  – Your computer must have the free Adobe Acrobat reader installed in order to view and print PDF files. The Acrobat reader is available on the Adobe Web site at *http://www.adobe.com*.

– Click the print icon in the upper left of the window.

Tip: If your printer supports printing two pages on a single sheet of paper, you can save paper and printer ink by selecting this feature.

- **Printing the Full Manual**.

  Use the *Complete PDF Manual* link at the top left of any page.

  – Click the Complete PDF Manual link at the top left of any page in the manual. The PDF version of the complete manual opens in a browser window.

  – Click the print icon in the upper left of the window.

Tip: If your printer supports printing two pages on a single sheet of paper, you can save paper and printer ink by selecting this feature.

Chapter 1
Basic Setup

The NETGEAR RangeMax NEXT Wireless Notebook Adapter WN511B lets you connect a PC computer to wireless networks. It is designed for PC computers running Microsoft Windows. For information about product features and compatible NETGEAR products, see the NETGEAR website at *http://www.netgear.com*.

This chapter describes how to install your Wireless Notebook Adapter and set up basic wireless connectivity on your Wireless Local Area Network (WLAN). Advanced wireless network set up is covered in Chapter 1, "Network Connections and Wireless Security.

What You Need Before You Begin

You need to verify that your computer meets the minimum system requirements and identify the wireless network settings of the wireless network where you will connect before you can set up your wireless PC card and connect.

Verify System Requirements

Before installing the Wireless Adapter, please make sure that these minimum requirements have been met. You must have a computer with:

- A Pentium 300 MHz or higher compatible processor with an available Cardbus slot.
- A CD drive.
- 10 MB of free hard disk space.
- Windows Vista, XP, or 2000.

Observe Wireless Location and Range Guidelines

Computers can connect over wireless networks indoors at a range which vary significantly based on the location of the computer with the Wireless Adapter. For best results, avoid potential sources of interference, such as:

- Large metal surfaces
- Microwave ovens
- 2.4 GHz Cordless phones

In general, wireless devices can communicate through walls. However, if the walls are constructed with concrete, or have metal, or metal mesh, the effective range will decrease if such materials are between the devices.

What Is in the Box

The product package should contain the following items:

- NETGEAR RangeMax NEXT Wireless Notebook Adapter WN511B
- *NETGEAR RangeMax NEXT Wireless Notebook Adapter WN511B Installation Guide*
- *NETGEAR CD*, including:
  - Driver and Configuration Utility Software
  - *NETGEAR RangeMax NEXT Wireless Notebook Adapter WN511B User Manual* (this document)
- Warranty and Support information card

If any of the parts are incorrect, missing, or damaged, contact your NETGEAR dealer. Keep the carton, including the original packing materials, in case you need to return the product.

Default Wireless Settings

If this is a new wireless network installation, use the factory default settings to set up the network and verify wireless connectivity. If this is an addition to an existing wireless network, you need the wireless network and wireless security settings that are already defined.

Your Wireless Adapter factory default basic settings are:

- Network Name Service Set Identification (SSID): **NETGEAR**

	Note: In order for the Wireless Adapter to communicate with a wireless access point or wireless adapter, all devices must be set up to use the same wireless network name (SSID).

- Network Mode (Infrastructure or Ad-hoc): **Infrastructure**
- Data security WEP, WPA2-PSK, or WPA-PSK encryption: **Disabled**

Installation

The instructions in this chapter are for an Access Point (Infrastructure) installation. Wireless security, advanced settings, and Computer-to-Computer (Ad Hoc) instructions are covered in Chapter 1, “Network Connections and Wireless Security.

To install the Wireless Notebook Adapter.

1. First, install the WN511B software.

Insert the NETGEAR CD. If the CD main page does not appear, double click Autorun.exe on the CD.

a. Click Install the Software.The Check for Updates window will open.

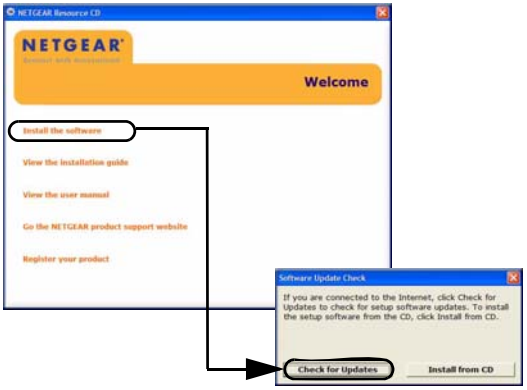

Figure 1-1

b. If you are connected to the Internet, click Check for Updates. If not, you can choose to install from the CD.

c. When the Installation Complete message appears, click Next.

d. On the Smart Wizard screen, click Next to proceed with the SmartWizard setup.

2. Now, insert the Wireless Notebook Adapter.

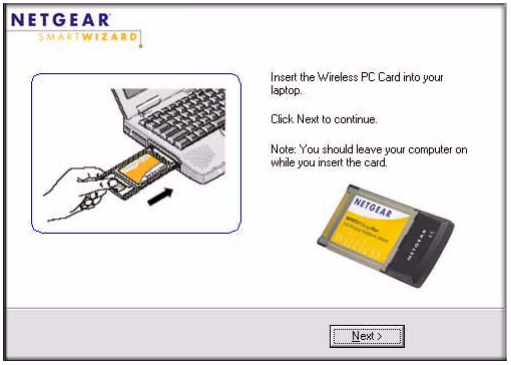

Figure 1-2

   a. When prompted, insert your Wireless Notebook Adapter.

   b. Click Next to proceed. Windows will discover the adapter and continue the software installation process.

   c. Follow the Windows prompts to complete the software installation.

   d. If a Windows logo certification warning appears, click Continue to proceed with the installation.

   e. When the Windows software installation is complete, click Finish.

3. Use the Smart Wizard to set up your Wireless Notebook Adapter.

   a. Windows 2000 users go to Step b. Windows XP or Vista users can set up the wireless adapter with the NETGEAR Smart Wizard (recommended) or the Windows configuration utilities.

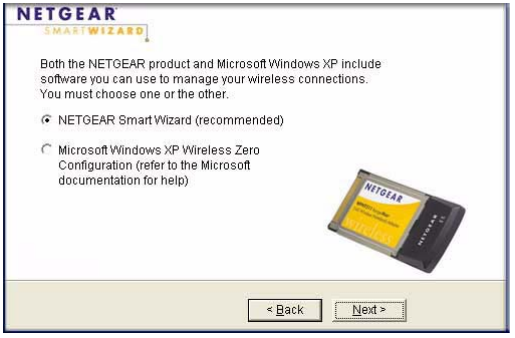

Figure 1-3

- **NETGEAR Smart Wizard:** Reveals more information about each network and makes it easier to troubleshoot network connection problems. See "Smart Wizard Status Bar" on page 1-8 and "Connecting to Wireless Networks and the Internet" on page 1-7.
- **Windows configuration utilities:** See the Windows documentation or *http://documentation.netgear.com/reference/enu/winzerocfg/index.htm*

b. Click **Next** to accept the NETGEAR Smart Wizard. You will be prompted to let the wizard help you connect to a network (recommended).

Figure 1-4

c. Click Next to accept.

4. Connect to a wireless network.

a. Select the wireless network from the drop-down list, and the wizard records your choice.

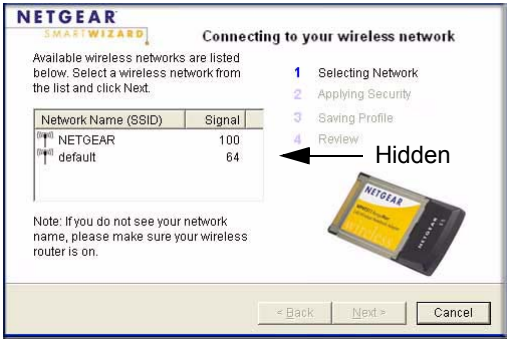

Figure 1-5

Note: Hidden networks do not broadcast the Network Name (SSID). These networks are in the drop-down list, but the Network Name (SSID) is blank.

b. The Smart Wizard will detect if the network uses security or not. Follow the Wizard steps for Security (if used) and for saving a Profile.

c. After you have reviewed the settings, click Finish.

d. After you have reviewed the settings, click Finish.

The icon appears in the System Tray and desktop; and the Settings page opens.

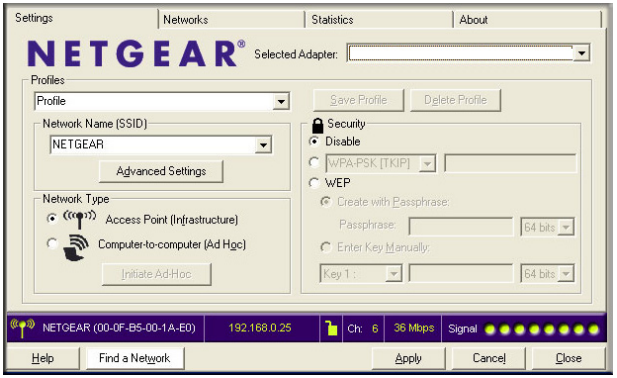

Figure 1-6

The wizard initiates your wireless connection. It could take up to a minute for your wireless connection to be established.

5. Use the status bar to verify your wireless connectivity. For more information about connecting, see "Connecting to Wireless Networks and the Internet" on page 1-7.

Connecting to Wireless Networks and the Internet

The Wireless Adapter has indicators that show the status of your connection to a wireless network and to the Internet:

- **Icon:** After you install the software, this icon appears on the desktop and in the lower right of the Windows task bar. It is color coded to show the status of the connection.
- **Smart Wizard Status Bar:** Clicking on the system tray icon opens the Smart Wizard. The status bar at the bottom of the page shows details about your wireless and Internet connection. See "Smart Wizard Status Bar" on page 1-8.

Icon Colors

The icon is on the desktop and in the Windows System Tray. The System Tray is located on one end of the taskbar in the Microsoft Windows desktop.

Color	Condition	Description
Red	The wireless PC card has no connection to any other wireless node.	The Wireless Adapter can not link to any other wireless node or the link is lost. Check your configuration or try moving to a location where the wireless signal quality is better.
Yellow	The wireless PC card has a connection with another wireless node.	The wireless link is weak. You may need to move to a better spot, such as closer to the wireless access point. Also, look for possible interference such as a 2.4 GHz cordless phone or large metal surface.
Green	The wireless PC card has a connection with another wireless node.	The wireless PC card has established good communication with an access point and the signal quality is strong.

Smart Wizard Status Bar

Click the icon to open the Smart Wizard so you can view the status bar. The Smart Wizard Settings page opens. The status bar is located at the bottom of the Settings page.

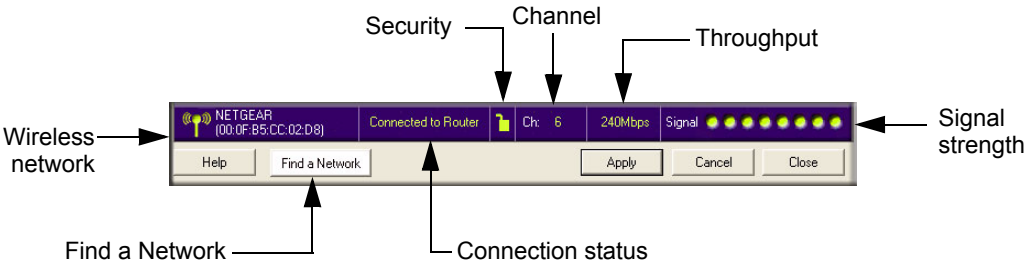

Figure 1-7

The following table describes how to interpret the Smart Wizard status bar.

Understanding the Status Bar	
Wireless network	Identifies which wireless network you have joined.
Security	• Locked: security enabled. • Unlocked: security not enabled.
Channel	The wireless channel used by the network. If many wireless networks in your area use the same channel they can interfere with one another.
Throughput	Wireless throughput measured in Mega bits per second.
Signal strength	More dots indicates a stronger signal. Usually, you will experience higher throughput when the signal is strongest.
Find a Network	Click **Find a Network** to open the Connection Wizard.
Connection status	Identifies the status of your network connection. • **Connected to Internet:** Wireless Internet connection is OK. • **Connected to Router:** Wireless connection to the router is OK but the router is not connected to the Internet. • **169.254.x.x or ___.___.___.___ :** The wireless connection to the router is OK but there is a problem with the router. See Chapter 1, “Troubleshooting”.

Note: To optimize throughput, connect to a network with a high-speed router or access point, and a high-speed Internet connection. For more information about optimizing wireless performance, and network bandwidth, see “Optimizing Wireless Performance” in Chapter 3 and “Optimizing Your Network Bandwidth” in Chapter 3.

If you right-click in the System Tray icon, you can disable the Internet notification feature by clearing check mark on this line. If you do so, then only the IP address is shown.

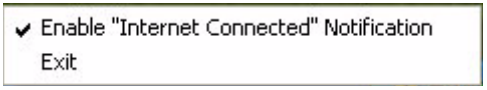

Figure 1-8

Removing the Software

You can remove the Wireless Adapter software in these two ways:

- Navigate the Windows Start menu to the Wireless Notebook Adapter program group, select the uninstall option, and follow the screen prompts.
- Navigate the Windows Start menu to the Control Panel Add or Remove Program item, select the Wireless Notebook Adapter option, and follow the screen prompts.

Upgrading the Wireless Adapter Software

Upgrades may be available at the NETGEAR website. To install an upgrade, follow these steps.

1. Go to *http://kbserver.netgear.com*
2. Click the latest version of upgrade.
3. Examine the Release Note. Make sure to read any warnings and Known Problems.
4. Download the upgrade using the link in the Release Note.
5. Follow the Release Note installation instructions.

Chapter 1
Network Connections and Wireless Security

This chapter explains how to use your Wireless Notebook Adapter to connect to your Wireless Local Area Network (WLAN) and how to set up wireless security for the Wireless Notebook Adapter so that it matches the wireless security settings for your network.

If you chose the Windows XP or Windows Vista Zero Configuration utility during installation, and now you want to use the Smart Wizard, then you need to disable the Windows utility. If you are working with the Vista configuration utility, see the online document: *http://documentation.netgear.com/reference/enu/winzerocfg/index.htm*

Disabling the Windows Zero Configuration Utility

To disable the Windows Zero Configuration utility:

1. Attach the wireless adapter to a USB port for your computer.
2. Go to Windows Start menu and select Network Connections.
3. On the Network connections page, select the Wireless Network Connection and right-click to choose the Properties option.

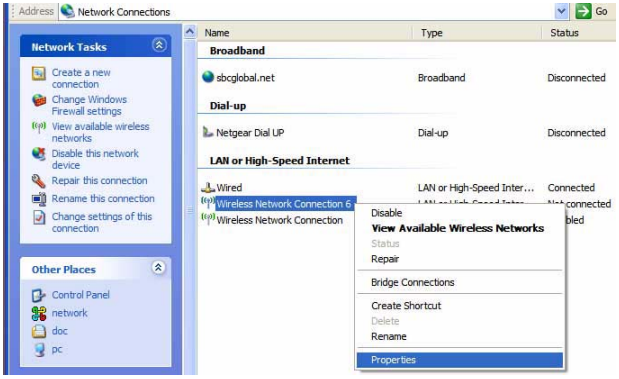

Figure 1-1

4. Click the Wireless Networks tab. Then clear the “Use Windows to configure my wireless settings” check box.

Understanding the Smart Wizard

These instructions explain how to use the NETGEAR WN511B Smart Wizard to change the Wireless Notebook Adapter wireless settings.

When you have installed the software from the *NETGEAR CD*, the icon appears on your desktop and in the Windows System Tray. The Windows System Tray is located on the Windows taskbar. You can either double-click this icon on the desktop, or click it in the System Tray at any time, to use the Smart Wizard. This software automatically restarts when you reboot your computer.

The Smart Wizard provides a complete and easy to use set of tools to:

- View details about wireless networks in your area.
- Choose the network that you want to use.
- Configure wireless settings for your wireless PC card
- Save your wireless network settings in profiles.
- Remove or reinstall the wireless adapter software.

The following sections in this chapter explain how to use the Smart Wizard.

Viewing Wireless Networks in Your Area

You can use the Networks tab to view all available wireless networks in your area. You can also scan to search for wireless networks and refresh the page.

To view information about wireless networks:

1. Use the icon to open the Smart Wizard. The Settings tab page opens.

2. Click the Networks tab to view the following page:

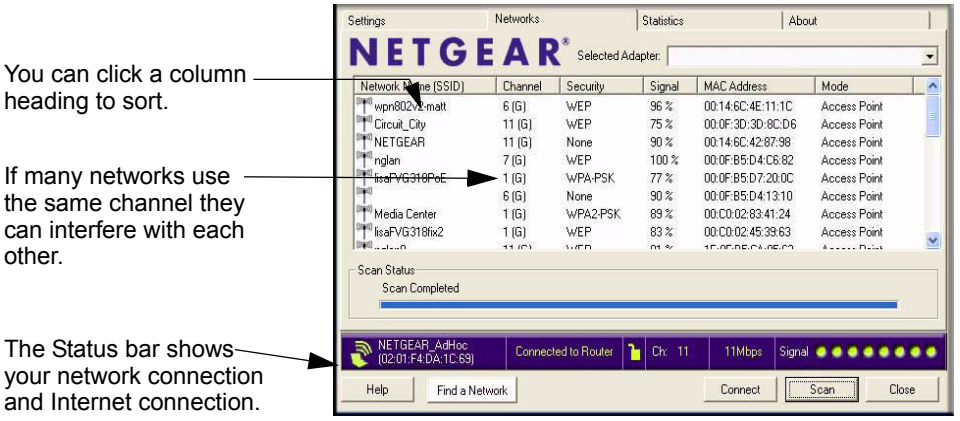

Figure 1-2

The screen shows the following information for each network scanned:

- **Network Name (SSID):** The name assigned to a wireless network. This is the same as the SSID or ESSID configuration parameter. Note that as a security measure, some wireless access points do not broadcast their SSID. In such cases, the SSID field will be blank even though the rest of the information will still be displayed.
- **Channel:** The channel determines which operating frequency will be used.
- **Security:** Identifies whether the wireless network uses security settings such as WEP, WPA2-PSK, or WPA-PSK.
- **Signal:** Identifies the signal strength of the communications.
- **MAC Address:** Identifies the hardware address (MAC Address) of the wireless device broadcasting this information.
- **Mode:** Identifies the type of wireless network — Access Point (Infrastructure) or Computer-to-Computer (Ad Hoc)

The buttons located at the bottom of the Networks tab are:

- **Help:** Display online help.
- **Find a Network:** Find and connect to a network. See “Finding a Network” on page 2-4.
- **Connect:** Connect to the network that you selected.
- **Scan:** Check for wireless networks. Clicking Scan refreshes the page.
- **Close:** Close the window of the Wizard.

Finding a Network

During the WN511B software installation, the Smart Wizard lists the available networks. After installation you can use the Find a Network button on the Network tab at any time to view the available networks and select the one that you want to use.

	Note: Make sure that you know the security settings for the network that you want to use. For example, if Wired Equivalent Privacy (WEP) is used then you need to know the WEP key. If you use secure networks frequently, set up profiles for each network with the wireless network and security settings.

Follow the steps below to Find a Network:

1. Use the icon to open the Smart Wizard.

   The Settings tab page opens.

2. On the Networks tab page, click **Find a Network**.

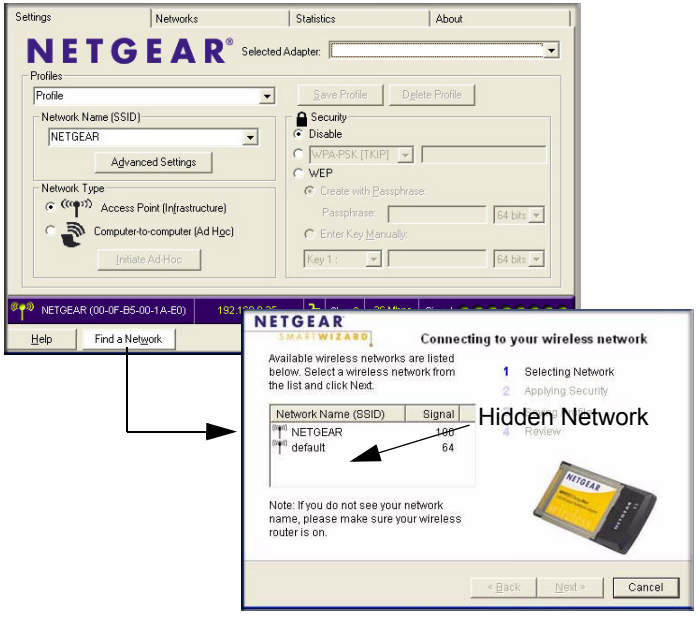

Figure 1-3

3. Select a network from the drop down list. If you select a hidden network then you must enter the SSID. Click Next.

4. Follow the steps of the wizard to specify the wireless security if used, and to create a profile.
5. Review you settings, and click Finish.

The Smart Wizard initiates your wireless connection. You can use the Status Bar to verify your network connection. For more information, see "Smart Wizard Status Bar" on page 1-8.

Profiles

The WN511B Smart Wizard uses profiles to store all the settings for a particular wireless network. There are two special profile names: Default and Profile.

- **Default:** The Profile named Default automatically scans for any available network. You cannot change this profile name.
- **Profile:** If you do not enter a name in the Profile Name box, then the name Profile is used to save your settings. If you do this more than once then you will be asked if you want to replace the previous settings stored in Profile.

Adding Profiles

You can store multiple profiles and recall the one which matches the network you want to join.

If you use your computer to connect to different wireless networks, you can create a profile for each wireless network. Then, you can easily load the profile that has all the settings that you need to join the network you are using at the time.

There are two types of wireless network profiles that you can set up:

- **Access Point (Infrastructure) —** connect to an access point or router with the 802.11 infrastructure mode.
- **Computer-to-Computer (Ad Hoc) —** connect directly to another computer with the 802.11 ad hoc mode.

For more information on 802.11 wireless network modes, see the wireless reference document at: *http://documentation.netgear.com/reference/enu/wireless/index.htm*

Setting up a Profile to Connect to an Access Point or Router

Follow these instructions to set up the Wireless Notebook Adapter to connect to a wireless access point or router.

1. Use the icon to open the Smart Wizard. The Settings page opens.

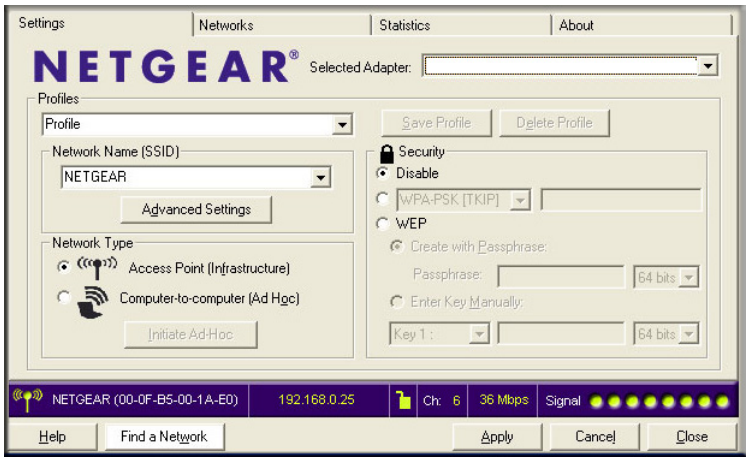

Figure 1-4

2. Enter the network settings.
   a. In the Network Type section, be sure that Access Point (Infrastructure) is selected.
   b. In the Profile box, type the name of the profile.
   c. In the Network Name (SSID) field select a network or enter the SSID.

	Note: You will not get a wireless network connection unless the SSID that you enter exactly matches the SSID used by the access point.

3. Save your settings in a Profile.
   a. Click the Save Profile button.

      All the configuration settings are saved in this profile.
   b. Click **Apply**.
   c. Click Close to exit the wizard, or Cancel to return to the previous settings.
4. Verify wireless connectivity to your network.

   Verify connectivity by using a browser such as Netscape or Internet Explorer to connect to the Internet, or check for file and printer access on your network.

You can check the status bar in the Smart Wizard for the current connection status.

Note: If you cannot connect, see Chapter 1, "Troubleshooting. Also, for problems with accessing network resources, the Windows Client and File and Print Sharing software might not be installed and configured properly on your computers. Refer to "Internet Networking and TCP/IP Addressing" in Appendix B.

Setting up a Computer-to-Computer (Ad Hoc) Profile

The Computer-to-Computer setting uses Ad Hoc mode. Ad Hoc mode is an 802.11 networking framework in which devices or computers communicate directly with each other, without the use of an access point. For example, this mode is used when two Windows computers are configured with file and print sharing enabled and you want to exchange files directly between them.

Note: Ad Hoc mode will not work using DHCP settings. Ad Hoc mode requires either static IP addresses (such as **`192.168.0.1`**) or the IPX protocol. For instructions on setting up static IP addresses on a Windows PC, refer to the PC Networking Tutorial included on the *NETGEAR CD*.

To create an Ad Hoc mode profile:

1. Use the icon to open the Smart Wizard. The Settings page opens.
2. Enter the network settings.

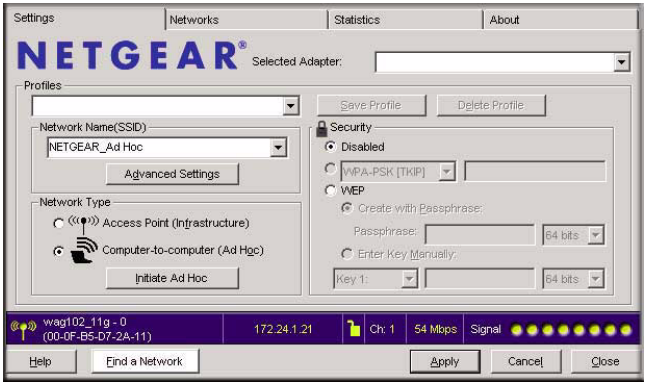

Figure 1-5

a. Select Computer-to-Computer (Ad Hoc) for the Network Type.

b. Select or enter the Network Name (SSID) for the Ad Hoc network.

c. In the Profile box, type the name of the profile.

3. Click **Apply**.

4. Save your settings in a Profile.

a. Click the Save Profile button.

The configuration settings are saved in this profile.

b. Click **Apply**, and then click Close to exit the Smart Wizard, or Cancel to return to the previous settings.

5. Configure the PC network settings.

a. Configure each PC with either a static IP address or with the IPX protocol.

Note: For instructions on configuring static IP addresses, refer to the networking tutorial on your *NETGEAR CD*.

b. Restart the PCs.

6. Verify wireless connectivity between your peer devices with the Ping program:

a. On the Windows taskbar click the Start button, and then click Run.

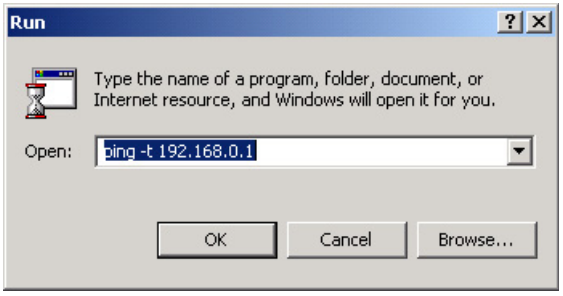

Figure 1-6

b. Assuming the target PC is configured with 192.168.0.1 as its IP address, type **`ping -t 192.168.0.1`** and then click OK.

c. This will cause a continuous ping to be sent to the device with the 192.168.0.1 static IP address. The ping response should change to “reply.”

```
Request timed out.
Request timed out.
Reply from 192.168.0.1: bytes=32 time=40ms TTL=127
Reply from 192.168.0.1: bytes=32 time=41ms TTL=127
Reply from 192.168.0.1: bytes=32 time=30ms TTL=127
```

Figure 1-7

At this point the connection is established.

Note: If you cannot connect, see “Connecting to Wireless Networks and the Internet” in Chapter 1. For problems with accessing network resources, the Windows Client and File and Print Sharing software might not be installed and configured properly on your computers. See the link to “Internet Networking and TCP/IP Addressing” in Appendix B.

Starting a Computer-to-Computer (Ad Hoc) Network Connection

1. On the Settings tab page of the Smart Wizard, select or type the Network Name (SSID).
2. Select the Computer-to-Computer (Ad Hoc) network type.
3. Click Initiate Ad Hoc. The Ad Hoc Setting dialog box opens:

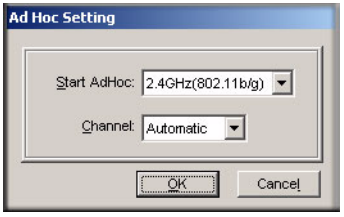

Figure 1-8

4. In the Start Ad Hoc field, choose the wireless standard (802.11a, 802.11b, or 802.11g) for your Ad Hoc computer-to-computer network.
5. In the Channel field, Automatic should work. If you notice interference problems with another nearby wireless device, select a channel that is not being used by any other wireless networks near your wireless adapter. Use the Networks tab page to identify the channels in use in your area.

6. Click **OK**.

	Note: The channel number differs depending on the country. The connection speed automatically defaults to the highest speed.

Wireless Security

Many networks use wireless security to encrypt wireless data communications. If you try to connect to a network with wireless security the Smart Wizard detects it. Before you can use that network you must set up the Wireless Notebook Adapter with exactly the same kind of wireless security settings. The Wireless Notebook Adapter supports the following types of wireless security:

- Wi-Fi Protected Access 2 Pre-Shared Key (WPA2-PSK)
- Wi-Fi Protected Access Pre-Shared Key (WPA-PSK)
- Wired Equivalent Privacy (WEP)

For more information about wireless security, see the wireless reference document at: *http://documentation.netgear.com/reference/enu/wireless/index.htm*

In addition to the wireless security features, networks should use LAN network security features such as requiring a user name and password to access the shared resources in the network.

Using Wireless Security Features

You can strengthen the security of your wireless connection by enabling Wired Equivalent Privacy (WEP) encryption of the wireless data communications. Or, you can use Wi-Fi Protected Access Pre-Shared Key (WPA-PSK) encryption. For more information about wireless security, see the online document *http://documentation.netgear.com/reference/enu/wireless/index.htm*

In addition to the Wireless Notebook Adapter wireless security features, you should also configure appropriate LAN network security features such as requiring a user name and password to access the shared resources in your network.

Wireless Network Name (SSID) and Security Settings

Print this page, fill in the configuration details, and keep it in a safe place for future reference. For an existing wireless network, the person who set up the network will be able to provide this information.

- **Network Name (SSID):** The Service Set Identification (SSID) identifies the wireless local area network. **Any (First available network)** is the default wireless network name (SSID). You may customize it using up to 32 alphanumeric characters. Write your customized wireless network name (SSID) on the line below:

  Note: You must configure your Wireless Notebook Adapter with the SSID used by the wireless access point. Otherwise the Wireless Notebook Adapter and the access point will not be able to communicate with each other.

  Wireless network name (SSID): _____

- If WEP Authentication is Used.
  - **WEP Encryption key size**. Select one: 64-bit or 128-bit. The encryption key size must the wireless network settings.
  - **Data Encryption (WEP) Keys**. There are two methods for creating WEP data encryption keys. Whichever method you use, record the key values in the spaces below.
    - **Passphrase method**. _____ These characters *are* case sensitive. Enter a word or group of printable characters and click the Generate Keys button. Not all wireless devices support the passphrase method.
    - **Manual method**. These values *are not* case sensitive. For 64-bit WEP, enter 10 hex digits (any combination of 0-9 or a-f). For 128-bit WEP, enter 26 hex digits.

    Key 1: _____ Key 2: _____

    Key 3: _____ Key 4: _____

- If WPA2-PSK or WPA-PSK Authentication is Used.
  - **Passphrase**: _____ These characters *are* case sensitive. Enter a word or group of printable characters. When you use WPA-PSK, the other devices in the network will not connect unless they are set to WPA-PSK as well and are configured with the correct Passphrase.

Setting up WEP Encryption Security

Follow the steps below to configure WEP Encryption Security.

1. Run the Smart Wizard.

a. Make sure the NETGEAR software is installed and the Wireless Notebook Adapter is fully inserted in the Cardbus slot port in your computer.

b. Use the icon to open the Smart Wizard. The Settings tab page opens.

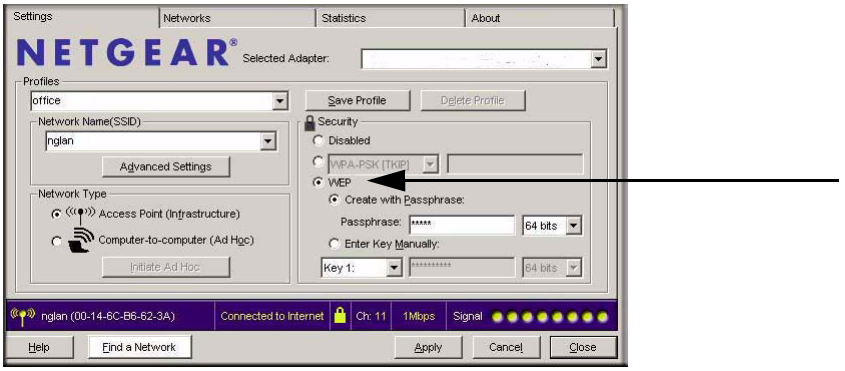

Figure 1-9

2. Configure the Security settings.

a. In the Profile box, select the profile or type in a profile name.

b. In the Network Name (SSID) field select the network, or enter the SSID.

Note: You will not get a wireless network connection unless the network SSID matches exactly what is configured in the access point.

c. In the Security section, select WEP.

3. Select the WEP encryption strength you will use:
   - 64-bit WEP data encryption
   - 128-bit WEP data encryption

> **Note:** Larger encryption keys require more processing and may slow the communications response times.

4. Select Create with Passphrase and enter the passphrase. The configuration utility will automatically generate the WEP keys.

> **Note:** The characters are case sensitive. Be sure to use the same passphrase for all the wireless devices in the network.

   If the passphrase method is not available in the other devices, you must manually enter the keys to match exactly what is in the access point and other 802.11b wireless devices.

5. Save your settings in a Profile.
   a. Click the Save Profile button. All the configuration settings are saved in this profile.
   b. Click **Apply**.
   c. Click Close to exit the configuration utility.

Setting up WPA2-PSK Security

Follow the steps below to configure WPA2-PSK Security.

1. Run the Smart Wizard.
   a. Make sure the NETGEAR software is installed and the Wireless Notebook Adapter is fully inserted in the Cardbus slot in your computer.

b. Use the icon to open the Smart Wizard. The Settings tab page opens.

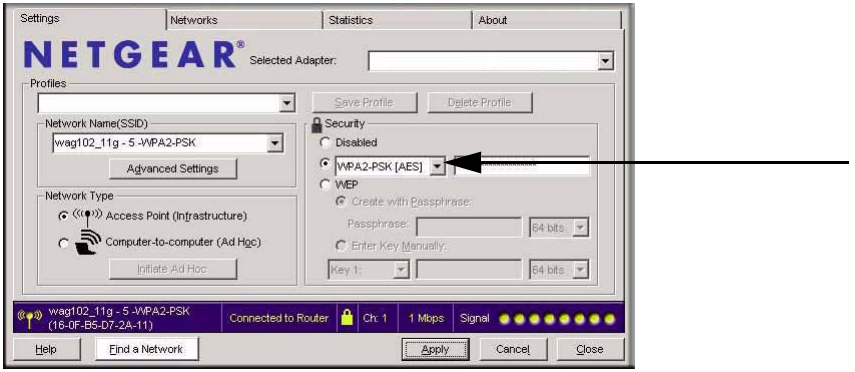

Figure 1-10

2. Configure the Security settings.

a. In the Profile box, select the profile or type in a profile name.

b. In the Network Name (SSID) field select the network, or enter the SSID.

	Note: You will not get a wireless network connection unless the SSID that you enter exactly matches the SSID used by the access point

c. In the Security section, select WPA2-PSK [AES].

For more information about WPA2-PSK security, see the online document: *http://documentation.netgear.com/reference/enu/wireless/index.htm*

3. Save your settings in a Profile.

a. Click the Save Profile button. All the configuration settings are saved in this profile.

b. Click **Apply**.

c. Click Close to exit the Smart Wizard.

Setting up WPA-PSK Security

Follow the steps below to configure WPA-PSK Security.

1. Run the Smart Wizard.

a. Make sure the NETGEAR software is installed and the Wireless Notebook Adapter is fully inserted in the Cardbus slot in your computer.

b. Use the icon to open the Smart Wizard. The Settings tab page opens.

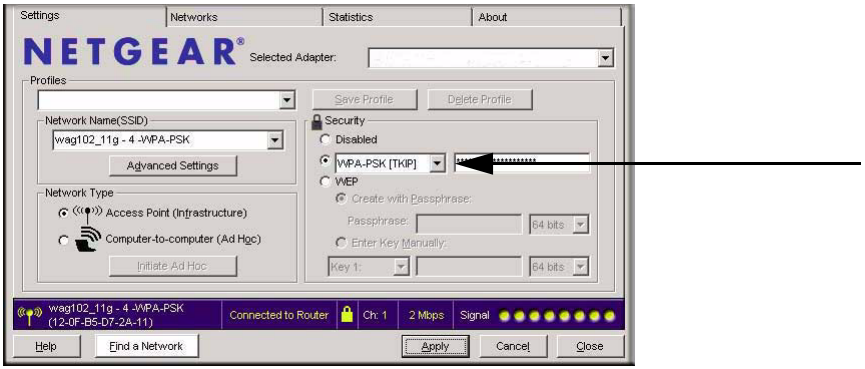

Figure 1-11

2. Configure the Security settings.

a. In the Profile box, select the profile or type in a profile name.

b. In the Network Name (SSID) field select the network, or enter the SSID.

	Note: You will not get a wireless network connection unless the SSID that you enter exactly matches the SSID used by the access point

c. In the Security section, select WPA-PSK [TKIP].

For more information on WPA security, see the online document:
http://documentation.netgear.com/reference/enu/wireless/index.htm

3. Save your settings in a Profile.

a. Click the Save Profile button. All the configuration settings are saved in this profile.

b. Click **Apply**.

c. Click Close to exit the Smart Wizard.

Advanced Settings

The Advanced Settings normally work in their default settings. To view them, click the Advanced Settings button on the Settings tab. Changing these settings is only recommended for advanced users who have a specific reason to adjust them. Use the Help button to understand these options.

Statistics Page

The Statistics page provides real-time and historical trend information on the data traffic and performance of your wireless adapter.

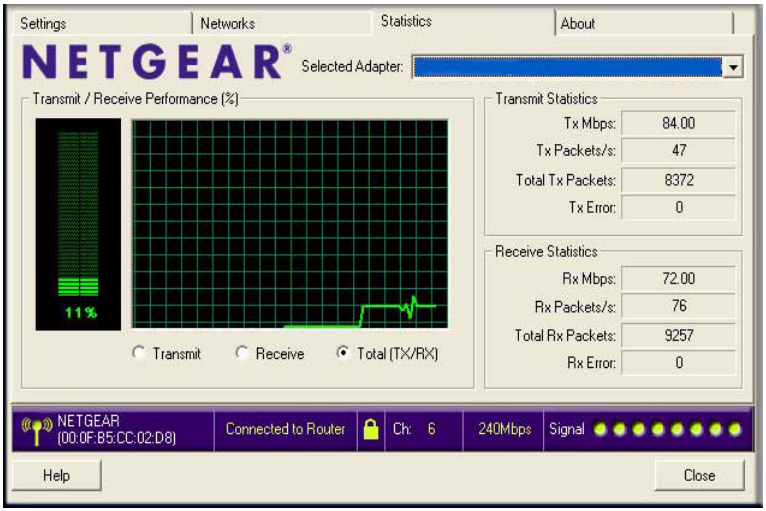

Figure 1-12

- **Transmit/Receive Performance (%):** A real-time graph identifying the total, receive, and transmit utilization as a percentage of the total possible.
- **Transmit, Receive, and Total (TxRx):** Radio buttons let you select whether to display the transmit performance, the receive performance, or both in the same graph.
- **Transmit Statistics:** Identifies transmit megabits per second (Mbps), transmit packets per second (Tx Packets/s), total transmitted packets, and transmit errors.
- **Receive Statistics:** Identifies receive megabits per second (Mbps), receive packets per second (Rx Packets/s), total received packets, and reception errors.

About Page

The About page displays the current software version information.

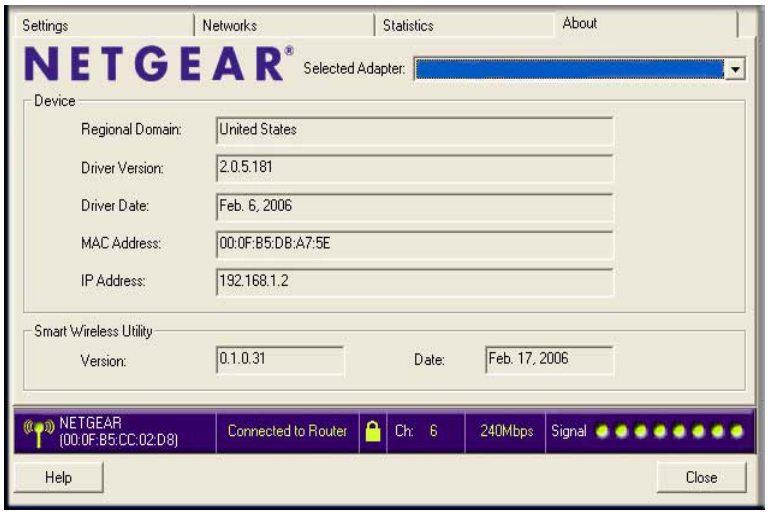

Figure 1-13

The following information is displayed in the About page:

- **Regional Domain:** This is the region setting for the wireless adapter. The approved channels for the region are automatically scanned. Governments regulate the channels used for wireless transmission. Operating the wireless adapter in a different region may violate local laws.
- **Driver Version:** The wireless adapter driver version.
- **Driver Date:** The wireless adapter driver release date.
- **MAC Address:** The MAC address of the adapter. The Media Access Control address is a unique 48-bit hardware address assigned to every network interface card. Some wireless networks will restrict access based on a list of known MAC addresses. If you are communicating with such a network, you would have to provide the address shown here to the network administrator before you would be allowed to connect. Restricting access by MAC address adds an obstacle against unwanted access to your network. However, unless you use data encryption security, the data broadcast over the wireless link is fully exposed.
- **IP Address:** The IP address assigned to this adapter.
- **Smart Wireless Utility:** The version and release date of the Smart Wizard.

Chapter 1
Wireless Network Performance

This chapter explains how to use your WPN511 Wireless PC Card to connect to your Wireless Local Area Network (WLAN) and how to set up wireless security for the WPN511 Wireless PC Card so that it matches the wireless security settings for your network.

Optimizing Wireless Performance

The speed and operating distance or range of your wireless connection can vary significantly based on the location of the wireless router. You should choose a location for your router that will maximize the network speed.

The following list describes how to optimize wireless router performance.

- Identify critical wireless links.
  If your network has several wireless devices, decide which wireless devices need the highest data rate, and locate the router near them. Many wireless products have automatic data-rate fallback, which allows increased distances without losing connectivity. This also means that devices that are further away may be slower. Therefore, the most critical links in your network are those where the traffic is high and the distances are great. Optimize those first.
- Choose placement carefully.
  For best results, place your router:
  - Near the center of the area in which your computers will operate.
  - In an elevated location such as a high shelf where the wirelessly connected computers have line-of-sight access (even if through walls).
- Avoid obstacles to wireless signals.
  - Keep wireless devices at least two feet from large metal fixtures such as file cabinets, refrigerators, pipes, metal ceilings, reinforced concrete, and metal partitions.
  - Keep away from large amounts of water such as fish tanks and water coolers.
- Reduce interference.
  Avoid windows unless communicating between buildings.
  Place wireless devices away from various electromagnetic noise sources, especially those in the 2400–2500 MHz frequency band. Common noise-creating sources are:

  - Computers and fax machines (no closer than one foot)
  - Copying machines, elevators, and cell phones (no closer than 6 feet)
  - Microwave ovens (no closer than 10 feet)

- Choose your settings.
  - Use a scanning utility to determine what other wireless networks are operating nearby, and choose an unused channel.
  - Turn off SSID Broadcast, and change the default SSID. Other nearby devices may automatically try to connect to your network several times a second, which can cause significant performance reduction.

Optimizing Your Network Bandwidth

The speed of network connections depends on the type of equipment that you use. Try to use high-speed technologies for network connections with the heaviest traffic to avoid lower-speed bottlenecks in the path. The following figure shows a home network that includes many different connection speeds.

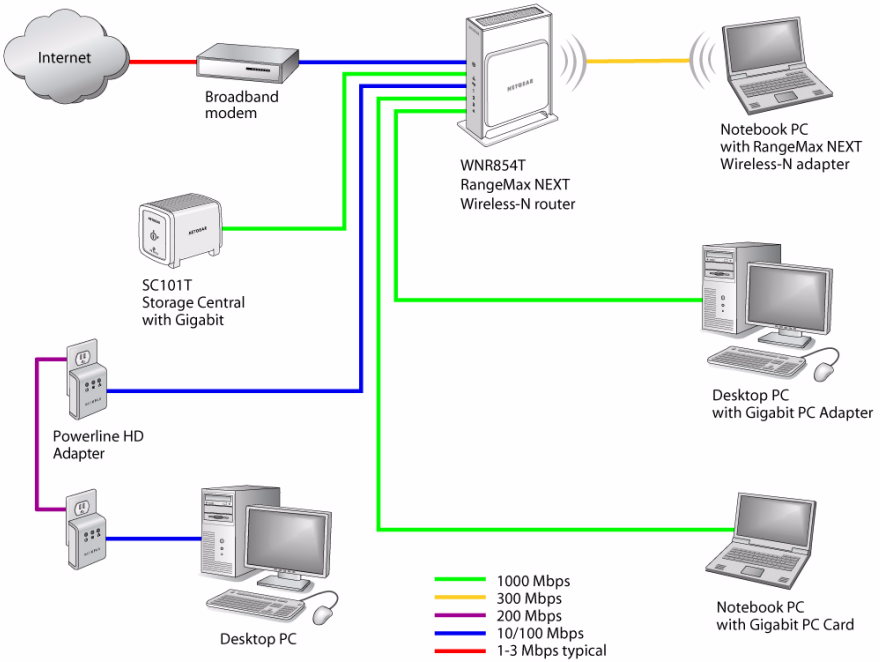

Figure 3-1

In the network shown in Figure 3-1, the two PCs with gigabit (1000 Mbps) Ethernet adapters have a gigabit connection through the router to the storage server. With a high-speed router this connection allows for extremely fast backups or quick access to large files on the server. The PC connected through a pair of Powerline HD adapters is limited to the 200 Mbps speed of the Powerline HD connection. Although any of the links in this example would be sufficient for high-traffic applications such as streaming HD video, the use of older devices such as 10 Mbps Ethernet or 802.11b wireless would create a significant bottleneck.

In planning your network, think about which tasks will have the heaviest traffic flow between them. Examples are:

- A media center in one room streaming high-definition video from a server in another room
- A storage device that is used for backing up your computers

Overview of Home and Small Office Networking Technologies

Common connection types and their speed and security considerations are:

- **Broadband Internet**
  Your Internet connection speed is determined by your modem type, such as ADSL or cable modem, as well as the connection speed of the sites to which you connect, and general Internet traffic. ADSL and cable modem connections are asymmetrical, meaning they have a lower data rate *to* the Internet (upstream) than *from* the Internet (downstream). Keep in mind that when you connect to someone else who also has an asymmetrical connection, the data rate between your sites is limited by each side's upstream data rate. A typical residential ADSL or cablemodem connection provides a downstream throughput of about one to three megabits per second (Mbps). Newer technologies such as ADSL2+ and Fiber to the Home (FTTH) will increase the connection speed to tens of Mbps.
- **Wireless**
  A high-speed wireless router can provide a wireless data throughput of up to 300 Mbps using technology called Multiple-Input Multiple-Output (MIMO), in which multiple antennas transmit multiple streams of data. The use of multiple antennas also provides excellent range and coverage. With the introduction of the newer WPA and WPA2 encryption and authentication protocols, wireless security is extremely strong.

To get the best performance, use newer adapters such as RangeMax adapters for your computers. A high-speed router may be compatible with older 802.11b and 802.11g adapters, but the use of these older wireless technologies in your network can result in lower throughput overall (typically less than 10 Mbps for 802.11b and less than 40 Mbps for 802.11g). In addition, many older wireless products do not support the latest security protocols, WPA and WPA2.

- **Powerline**
  For connecting rooms or floors that are blocked by obstructions or are distant vertically, consider networking over your building's AC wiring. NETGEAR's Powerline HD family of products delivers up to 200 Mbps to any outlet, while the older generation XE family of products delivers 14 Mbps or 85 Mbps. Data transmissions are encrypted for security, and you can configure an individual network password to prevent neighbors from connecting.

  The Powerline HD family of products can coexist on the same network with older generation XE family products or HomePlug 1.0 products, but they are not interoperable with these older products.

- **Wired Ethernet**
  As Gigabit Ethernet ports become common on newer computers, wired Ethernet remains a good choice for speed, economy, and security. Gigabit Ethernet can extend up to 100 meters with twisted-pair wiring of CAT-5e or better. A wired connection is not susceptible to interference, and eavesdropping would require a physical connection to your network.

	Note: Actual data throughput will vary. Network conditions and environmental factors, including volume of network traffic, building materials and construction, and network overhead, can lower actual data throughput rate.

Assessing Your Speed Requirements

Because your Internet connection is likely to operate at a much lower speed than your local network, faster local networking technologies may not improve your Internet experience. However, many emerging home applications require high data rates. For example:

- Streaming HD video requires 10 to 30 Mbps per stream. Because latency and packet loss can disrupt your video, plan to provide at least twice the capacity you need.
- Streaming MP3 audio requires less than 1 Mbps per stream and does not strain most modern networks. Like video, however, streaming audio is also sensitive to latency and packet loss, so a congested network or a noisy link can cause problems.

- Backing up computers over the network has become popular due to the availability of inexpensive mass storage. Table 3-1 shows the time to transfer one gigabyte (1 GB) of data using various networking technologies.

Table 3-1. Theoretical Transfer Time for 1 Gigabyte

Network Connection	Theoretical Raw Transfer Time
Gigabit Wired Ethernet	8 seconds
RangeMax NEXT Wireless-N	26 seconds
Powerline HD	40 seconds
100 Mbps Wired Ethernet	80 seconds
802.11g wireless	150 seconds
802.11b wireless	700 seconds
10 Mbps Wired Ethernet	800 seconds
Cable Modem (3 Mbps)	2700 seconds
Analog Modem (56 kbps)	144,000 seconds (40 hours)

Chapter 1
Troubleshooting

This chapter provides information about troubleshooting your wireless PC card. For information about connecting to wireless networks and the Internet, see "Connecting to Wireless Networks and the Internet" in Chapter 1.

Troubleshooting Tips

Use the information below to solve common problems you may encounter. Also, refer to the knowledge base on the NETGEAR website at *http://www.netgear.com/support/main.asp*.

Table 1-1. Troubleshooting Tips

Problem	Action
I cannot connect to an access point. The access point is available and there is good signal strength.	• If the access point is WPA-PSK protected, you need the correct WPA-PSK passphrase. Otherwise, the WN511B will still be connected to the previous access point and you will not be able to change to the WPA-PSK access point. • If the access point is WEP protected (either 64 or 128 bit encryption), you will be prompted to enter the WEP encryption security information.
Throughput is only 54 Mbps.	The Wireless Notebook Adapter can operate at faster speeds. You are probably connecting to a standard 802.11g network. See Chapter 1, "Wireless Network Performance" for help in understanding how to get the best performance from your Wireless Notebook Adapter.
The Smart Wizard keeps asking me to save settings.	If you change the settings the Smart Wizard offers you the chance to save the changes. To avoid this prompt, simply click **Apply** before you close the Smart Wizard.
Two WN511B icons are in the system tray.	You have an older software version installed on your system and it needs to be removed. See "Removing the Software" in Chapter 1 or "Upgrading the Wireless Adapter Software" in Chapter 1.

Table 1-1. Troubleshooting Tips (continued)

Problem	Action
I can connect to the access point, but not the other computers on the network or to the Internet.	This could be a physical layer problem or a network configuration problem. 1. Check to make sure that the access point is physically connected to the Ethernet network. 2. Make sure that the IP addresses and the Windows networking parameters are all configured correctly. See the link to "Internet Networking and TCP/IP Addressing" in Appendix B. 3. Restart the cable or DSL modem, router, access point, and computer.
Viewing the IP address.	To view the Wireless Notebook Adapter IP address, click the WN511B icon to open the Smart Wizard. Then check the IP address in the About page.
No IP address is assigned to the Wireless Notebook Adapter.	This may occur if you upgraded your Wireless Notebook Adapter software and did not reboot your system. • Either restart your computer, or connect to a different access point. • It does not usually help to shut down the Smart Wizard or disable/enable the card.

Ad Hoc Mode is Not Working Correctly

You need to click the Initiate Ad Hoc button before you click **Apply**. Here is how you start an Ad Hoc network:

1. Fill in the Network Name (SSID).
2. Select the Computer-to-Computer (Ad Hoc) Network Type.
3. Click Initiate Ad Hoc.
4. Accept the default settings or make your changes and click OK
5. Click **Apply**.

Note: Be sure all computers in your Ad Hoc network are configured with static IP addresses in the same subnet.

Appendix A
Default Configuration Settings and Technical Specifications

Default Configuration Settings

The following table lists the default settings of your Product Family.

Feature		Description
Smart Wizard		Enabled
Wireless		
	Wireless Communication	Enabled
	Wireless Network Name (SSID)	Any (first available network)
	Security	Disabled
	Network Type	Infrastructure
	Transmission Speed	Auto[a]
	Country/Region	United States (varies by region)
	Operating Mode	g and b, up to 130 Mbps, g only up to 270 Mbps
	Data Rate	up to 270 Mbps

a. Maximum wireless signal rate (IEEE Standard 802.11n draft specification). Actual throughput will vary. Network conditions and environmental factors, including volume of network traffic, building materials and construction, and network overhead, lower actual data throughput rate.

Technical Specifications

This table below describes technical specifications for the WNT511T Wireless Notebook Adapter.

Antennas	2 separate PCB internal antennas
Standards	802.11g, 802.11b
Radio Data Rate	1, 2, 5.5, 6, 6.5, 9, 11, 12, 13, 13.5, 18, 19.5, 24, 26, 27, 36, 39, 40.5, 48, 52, 54, 58.5, 65, 81,104, 108, 117, 121.5, 130, 135, 162, 216, 243, and 270 Mbps
Frequency	2.4GHz to 2.5GHz CCK, OFDM, BPSK, QPSK, 16-QAM, 64-QAM Modulations
LED	Single LED – sold indicates connected to network – blinking indicates attempting to connect to network
Power	3.3V bus powered
Emissions	FCC Part 15 Class B, CE, C-Tick
Bus interface	Cardbus 5V
Provided drivers	Microsoft Vista, Windows XP, and Windows 2000
Operating Environment	Operating temperature: 0 to 45 degree C
Encryption	40-bit (also called 64-bit) and 128-bit WEP data encryption, WPA2-PSK, and WPA-PSK
Warranty	Limited 1-year warranty

Appendix B
Related Documents

This appendix provides links to reference documents you can use to gain a more complete understanding of the technologies used in your NETGEAR product.

Document	Link
Windows XP and Vista Wireless Configuration Utilities	*http://documentation.netgear.com/reference/enu/winzerocfg/index.htm*
Internet Networking and TCP/IP Addressing	*http://documentation.netgear.com/reference/enu/tcpip/index.htm*
Wireless Communications	*http://documentation.netgear.com/reference/enu/wireless/index.htm*
Preparing a Computer for Network Access	*http://documentation.netgear.com/reference/enu/wsdhcp/index.htm*
Virtual Private Networking (VPN)	*http://documentation.netgear.com/reference/enu/vpn/index.htm*
Glossary	*http://documentation.netgear.com/reference/enu/glossary/index.htm*